

Ground-Based Infrared Images of Jupiter During the Galileo and Cassini Epochs

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A set of images of Jupiter was made prior to and during the epoch of Galileo remote sensing and in-situ observations of Jupiter from NASA's Infrared Telescope Facility. In the near infrared, the images were made at wavelengths between 1.58 and 4.78 microns. Images were also made at longer wavelengths between 7 and 24 microns. A full set of images across these wavelengths was made before and on approach of the Galileo spacecraft to Jupiter, and at nearly each orbit encounter during the primary and extended missions. In addition, images were made at 5 near-infrared wavelengths that monitored cloud and auroral properties of the planet whenever the IRTF near-infrared facility camera was scheduled for a full night on the telescope. The latter images were made available publicly and can be obtained either from the IRTF or the atmospheres node of the Planetary Data System. Although the time interval between successive images is long enough to preclude making timelapse movies, they are sufficient for long-term observations of the planet. For example, they were critical in predicting the location and state of various features that were candidate targets for Galileo and Cassini remote sensing investigations. Comparisons between these images and both Galileo and Cassini results show interesting correlations between different observational phenomena related to the same physical cause (e.g. the vertical cloud structure and albedo properties that associate warm 5-micron regions with dark 1.58-micron regions). Other phenomena that are associated with the temperature structure were also noted, e.g. the lack of thermal discrimination between 5-micron hot spots and surrounding areas or the existence of a phase delay between tropospheric planetary-scale waves and those in the stratosphere. Several instances of these will be discussed, and acknowledgement given to several individuals in the amateur community who were successful in pointing out new phenomena of interest on the planet or who filled in temporal gaps in IRTF coverage of cloud structure. This work was supported by grants from NASA to the Jet Propulsion Laboratory and to the Institute for Astronomy.